

Gravity (chapter 8.1 in text)

What is gravity?

Aristotle - 300 BC ish - Gravity caused things with Earth and Water to fall, things with air and fire rise. Stuff with more Earth and Water fall faster. - Wrong

Galileo - 1600 AD ish - telescopes - studied motion - found that things fall at the same rate regardless of mass (small air resistance) - Copernican solar system - Sun at the centre

Keppler - planet orbits are ellipses, relationships between the speed and position of the planets.

Newton - 1700ish - apple is pulled to the Earth, why not the moon? All objects are pulled to each other. The moon falls to Earth but also pulls the Water on Earth creating tides.

F_g is proportional to the masses and inversely proportional to the distance between the centre of the masses, squared.

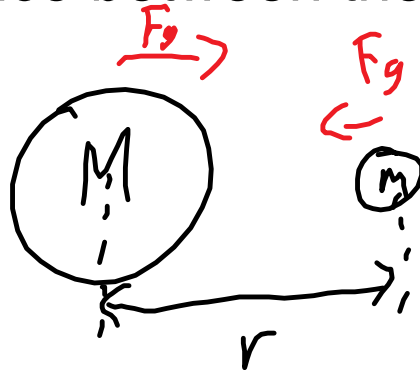
$$F_g \propto Mm/r^2$$

F_g is the force pulling the two masses together, in

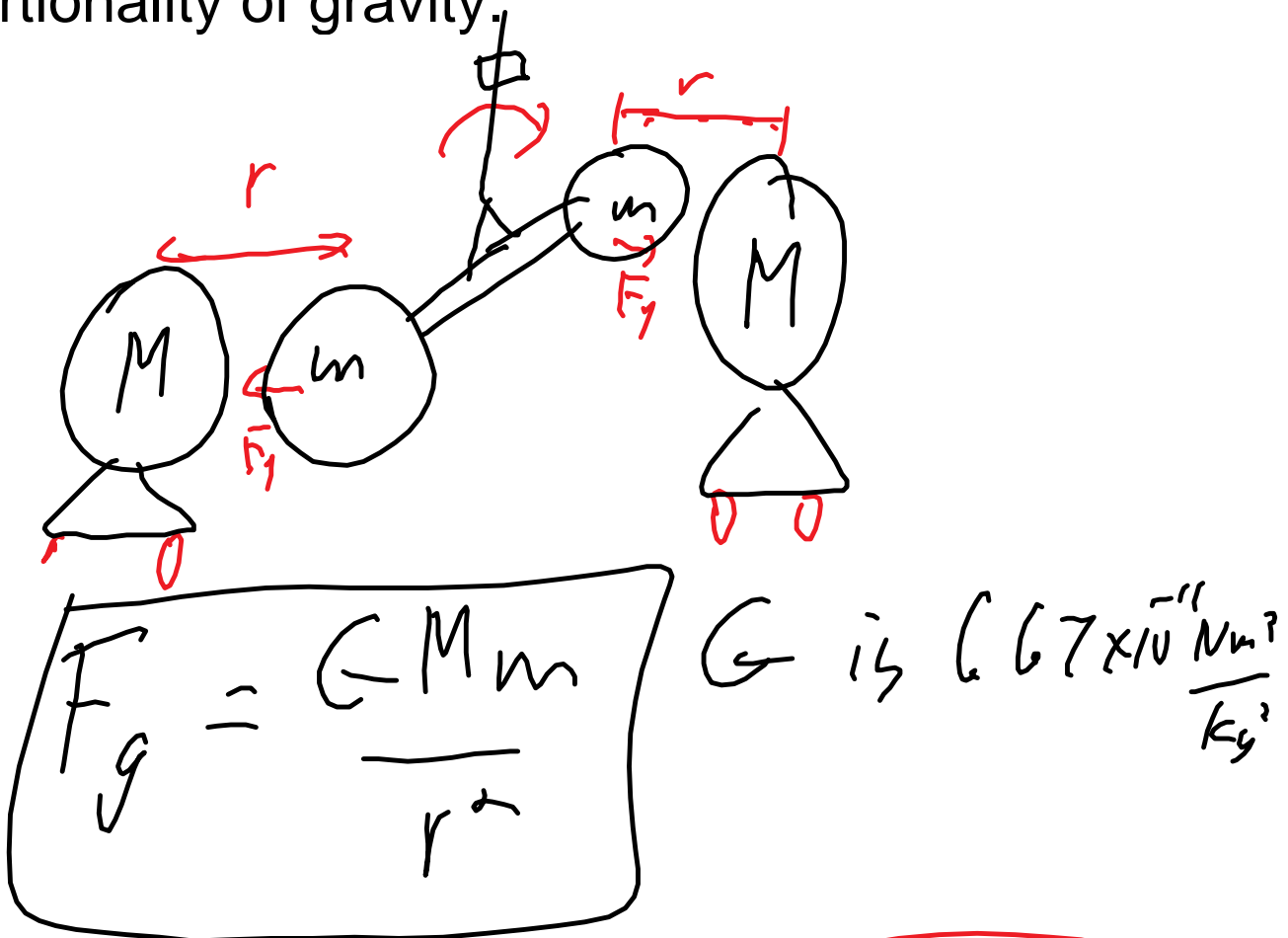
Newton's

M and m are any two masses, in kg

r is the distance between the masses, in metres



Cavendish - 1800ish - measured the constant of proportionality of gravity.



$$F_g = \frac{GMm}{r^2}$$

$$G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$$

Universal
Gravitational
constant

1. What is the gravitation attraction between a 50.0kg student and a 60.0 kg student 1.5 m apart? Why don't you slide over?
2. If g on earth is 9.81 N/kg and the radius of the Earth is 6.38×10^6 m, what is the mass of the Earth? (no cheating!)

